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INGV-DPC Project V3 - Research on active volcanoes, precursors, scenarios, hazard and risk – sub-project V3_3 – Ischia Research Unit V3_3/04

The second year of the project has been dedicated to the geomorphic quantitative analysis in order to identify the tectonic processes and the recent deformation affecting the Ischia island.
We have applied a method concerning: a) the extraction of several geomorphologic parameters from a high resolution DTM (2x2 pixel m); b) the identification of morphotectonic features such as linear continuity; c) spatial and statistical coherence of the structural discontinuities extracted. The final step of the methodology has provided the comparison and correlation with the geological, geomorphological and structural parameters of the literatures and field data.
The deliverables are shown in the following thematic maps (fig.1 and 2):

- *Shaded Relief Map:* the linear features have been extracted from the shaded relief (different light azimuth) and compared to the Ischia colour orthophoto. The azimuthal distribution shows a WNW-ESE average direction;
- *Slope Gradient Map* and *Tangential Curvature Map*: the lineaments extracted show two orthogonal NE-SW and NW-SE azimuthal distribution ;
- *Topographic Residual Surface Map*: the lineaments extracted show WNW-ESE azimuthal distribution;
- *RGB Composite Image* (R=*profile curvature, G=tangential curvatur, B=slope gradient),* of the morphometrical parameters, degraded to 10 meters and filtered to ten colours classes: areas with different textures are indicated in fig.2;
- *RGB Composite Image* (R=*profile curvature, G=tangential curvatur, B=slope gradient)*of the morphometrical parameters, degraded to 10 meters: different domains of deformation are indicated in fig.2.

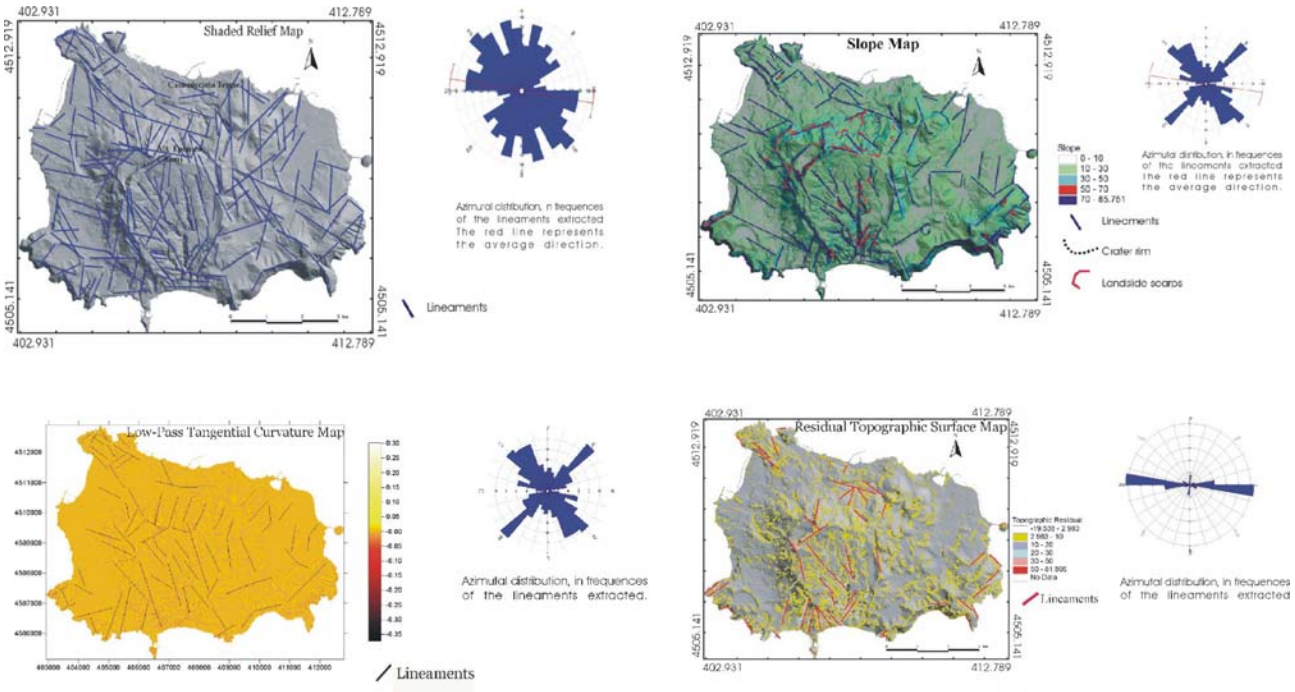
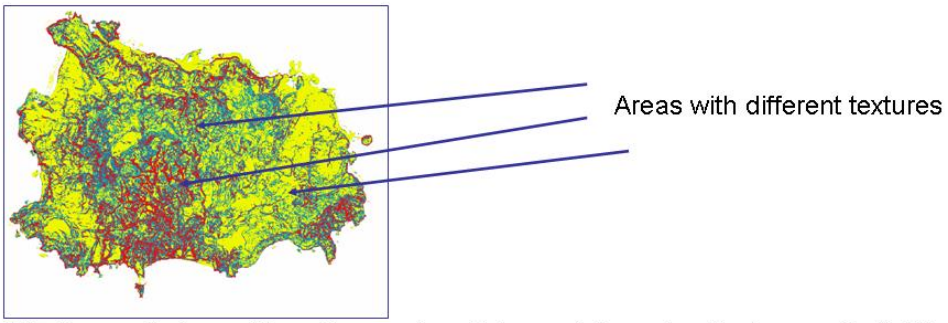


Fig.1 Thematic maps of the Ischia Island with the morphostructural lineaments and their azimuthal distribution.

RGB Composite Image (R=profile curvature, G=tangential curvatur, B=slope gradient), of the morphometrical parameters, degraded to 10 meters and filtered to ten colours classes



RGB Composite Image (R=profile curvature, G=tangential curvatur, B=slope gradient)of the morphometrical parameters, degraded to 10 meters

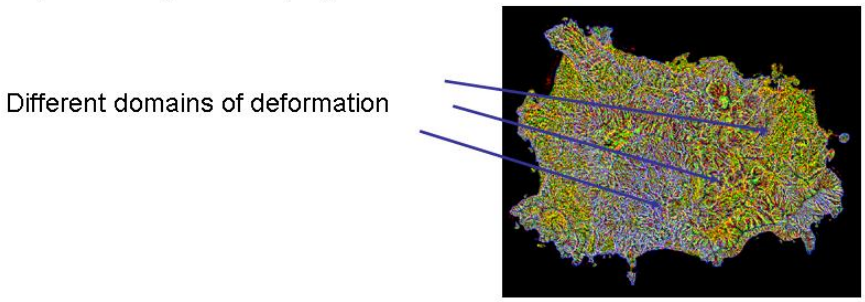


Fig.2 Composite Thematic Maps in which are shown different domains of deformation of the Ischia Island.

The joint interpretation of the morphostructural lineaments obtained by geomorphic analysis of the DTM integrated with structural field data has provided as significant output the synthesis map of the lineaments extracted (fig.3). In detail the following steps have been carried out: a) the lineaments extracted from each single thematic map have been compared with the fault lineaments of the field survey map; b) a final map has been processed which contains all the reliable lineaments, differently weighed and validated through multi-parameters analysis.

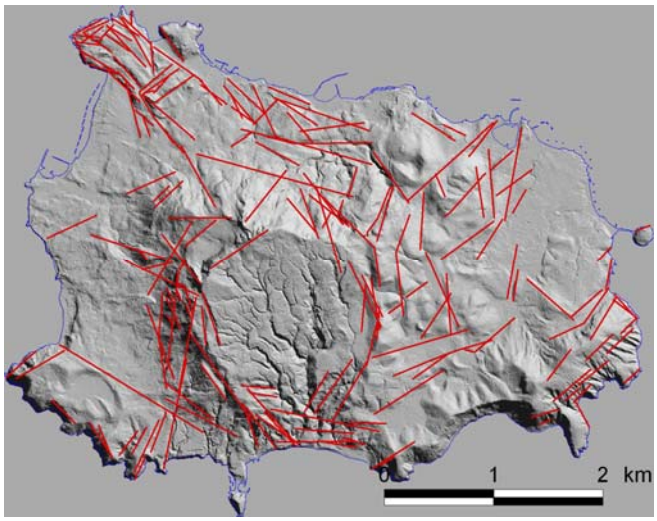


Fig. 3 Thematic Map of synthesis of the morphostructural lineaments

Paper submitted:

Nappi. R, Bellucci Sessa E., Vilardo G. (2006), *Analisi geomorfico-quantitativa dell'Isola d'Ischia*. Atti della 10ª Conferenza Nazionale ASITA, Bolzano 14-17 novembre 2006.

Nappi R., Alessio G., Vilardo G., Bellucci Sessa E., Ventura G., (2007), *ANALISI MORFOMETRICA INTEGRATA IN AMBIENTE GIS APPLICATA AD AREE TETTONICAMENTE ATTIVE COME CONTRIBUTO ALLA VALUTAZIONE DEI RISCHI AMBIENTALI* Geografia Fisica e Dinamica del Quaternario (Submitted).

Poster Presentation:

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Oral Presentation:

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